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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,307	10/28/2003	Seetharaman Sridhar	TI-36658 (032350.B546)	4176

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EXAMINER	
GUERRERO, MARIA F	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/695,307	SRIDHAR ET AL.	
	Examiner	Art Unit	
	Maria Guerrero	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 8-20* is/are pending in the application.

4a) Of the above claim(s) *17-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 8-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is the in response to the Amendment filed September 19, 2005.

Status of Claims

2. Claims 6-7 are canceled. Claims 1-5 and 8-20 are pending.

Election/Restrictions

3. Applicant's election without traverse of Group I (claims 1-16) in the reply filed on March 31, 2005 is acknowledged.

Claims 17-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 31, 2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-3 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizushima et al. (US 6,713,359) in view of Applicant admitted prior art.

5. Mizushima et al. shows providing a substrate having a source region, a channel region between the source and drain regions, and a gate region over the channel region of the substrate. Mizushima et al. discloses forming a silicon-germanium layer (18) in each of the source and drain regions in the substrate (Fig. 2A, col. 6, lines 20-45). Mizushima et al. teaches forming a silicon (19) layer outwardly from the silicon-germanium layer (18) in each of the source and drain regions (col. 6, lines 43-55). Mizushima et al. describes forming a silicide layer (20) in each of the source and drain regions (col. 6, lines 55-67, col. 7, lines 1-4).

6. Mizushima et al. shows depositing a reactive metal (cobalt) outwardly from the silicon layer in each of the source and drain regions, reacting the metal with at least the silicon layer and selectively removing the non-reacted metal from the substrate (col. 6, lines 55-67, col. 7, lines 1-4). Mizushima et al. discloses the silicon- germanium layer (18) having a thickness between 100 angstroms and 1000 angstroms and specifically within the range of between 300 angstroms and 500 angstroms (col. 6, lines 34-42).

7. Mizushima et al. is silent about the silicon-germanium configured to exert a compressive stress in the channel region of the substrate. However, Applicant admitted prior art is utilizing silicon-germanium layers to introduce compressive stress in the channel region of the substrate (page 2).

8. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to specify that the silicon-germanium layers is configured to exert a compressive stress in the channel region of the substrate in Mizushima et al. reference as taught by Applicant admitted prior art in order to improve hole mobility.

9. In addition, the recitation "configured to" is considered to be an intended use recitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

10. Claims 12-13 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizushima et al. (US 6,713,359).

11. Mizushima et al. shows providing a substrate having a source region, a gate region, and a drain region. Mizushima et al. discloses forming a silicon-germanium layer (18) in each of the source and drain regions. Mizushima et al. teaches forming a silicon (19) layer outwardly from the silicon- germanium layer (18) in each of the source and drain regions. Mizushima et al. describes forming a silicide layer (20) in each of the source and drain regions. Mizushima et al. shows depositing a reactive metal (cobalt)

outwardly from the silicon layer in each of the source and drain regions, reacting the metal with at least the silicon layer and selectively removing the non-reacted metal from the substrate (col. 6, lines 55-67, col. 7, lines 1-4). Mizushima et al. discloses the silicon- germanium layer (18) having a thickness between 100 angstroms and 1000 angstroms and specifically within the range of between 300 angstroms and 500 angstroms (col. 6, lines 34-42).

12. Mizushima et al. is silent about the thickness of the silicon layer being between approximately 25 angstroms and 150 angstroms. However, Mizushima et al. suggested that the thickness not being larger than 200 angstroms (col. 6, lines 52-55).

13. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the claimed thickness by routine experimentation because there is not evidence of criticality. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.

14. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rodder et al. (US 6,124,627) in view of Applicant admitted prior art.

15. Rodder et al. shows providing a substrate having a source region, a channel region between the source and drain regions, and a gate region over the channel region of the substrate (Fig. 2-3B, Abstract). Rodder et al. discloses forming a silicon-

germanium layer (106a) in each source and drain regions by epitaxy process (Abstract, Fig. 2, col. 2, lines 48-55, col. 4, lines 23-30). Rodder et al. teaches forming a silicon (106b) layer outwardly from the silicon- germanium layer (106a) in each of the source and drain regions (Abstract, Fig. 2). Rodder et al. describes forming a silicide layer in each of the source and drain regions (col. 4, lines 58-65; col. 6, lines 24-40).

16. Rodder et al. is silent about the silicon-germanium configured to exert a compressive stress in the channel region of the substrate. However, Applicant admitted prior art is utilizing silicon-germanium layers to introduce compressive stress in the channel region of the substrate (page 2).

17. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to specify that the silicon-germanium layers is configured to exert a compressive stress in the channel region of the substrate in Rodder et al. reference as taught by Applicant admitted prior art in order to improve hole mobility.

18. In addition, the recitation "configured to" is considered to be an intended use recitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

19. Claims 4-5 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rodder et al. (US 6,124,627) and Applicant admitted prior art as applied to claims 1 and 11 above, and further in view of Imai (US 5,872,039).

20. Regarding claims 4-5 and 8-10, the combination of Rodder and Applicant admitted prior art is silent about the thickness of the silicon-germanium layer and the silicon layer. Rodder does not specifically show the metal employed in the silicidation process. However, Imai discloses forming a titanium silicide layer by first forming an epitaxial layer (5) having a thickness of 300 angstroms and forming a second epitaxial layer (6) over the epitaxial layer (5) having a thickness of ½ (150 angstroms) to ¼ (75 angstroms) of the thickness of the epitaxial layer (5) (col. 5, lines 45-57, col. 6, lines 20-25).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Rodder et al. and Applicant admitted prior art by specify the use of the well known titanium and the thickness taught by Imai in order to ensure lateral scaling of the device while avoiding substrate consumption.

21. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rodder et al. (US 6,124,627) in view of Imai (US 5,872,039).

Rodder et al. shows providing a substrate having a source region, a gate region, and a drain region (Abstract). Rodder et al. discloses forming a silicon-germanium layer (106a) in each source and drain regions by epitaxy process (Abstract, Fig. 2, col. 2, lines 48-55, col. 4, lines 23-30). Rodder et al. teaches forming a silicon (106b) layer

outwardly from the silicon- germanium layer (106a) in each of the source and drain regions (Abstract, Fig. 2). Rodder et al. describes forming a low resistance material over the source and drain regions by salicidation of the portion of the source/drain regions 106 (col. 4, lines 58-65; col. 6, lines 24-40, col. 7, lines 24-40).

Rodder is silent about the thickness of the silicon-germanium layer and the silicon layer. Rodder does not specifically show the metal employed in the silicidation process. However, Imai discloses forming a titanium silicide layer by first forming an epitaxial layer (5) having a thickness of 300 angstroms and forming a second epitaxial layer (6) over the epitaxial layer (5) having a thickness of ½ (150 angstroms) to ¼ (75 angstroms) of the thickness of the epitaxial layer (5) (col. 5, lines 45-57, col. 6, lines 20-25).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Rodder reference by specify the use of the well known titanium and the thickness taught by Imai in order to ensure lateral scaling of the device while avoiding substrate consumption.

Response to Arguments

22. Applicant's arguments filed September 19, 2005 have been fully considered but they are not persuasive. Claims 12-16 stand rejected.

23. Applicant argued that Rodder fails to teach forming a silicon-germanium layer in the substrate. However, Rodder shows forming the silicon-germanium layer (106a) in

each source and drain regions in the substrate by epitaxy process (Abstract, Fig. 2, col. 2, lines 48-55, col. 4, lines 23-30).

24. Applicant argued that Mizushima et al. fails to teach forming a silicon-germanium layer in the substrate. However, Mizushima et al. discloses forming a silicon-germanium layer (18) in each source and drain regions in the substrate (Fig. 2A, col. 6, lines 20-45)

25. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "an additional epitaxial layer formed over a bulk semiconductor body prior to forming the gate oxide/gate electrode stack thereover) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

26. Furthermore, the transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., > Invitrogen Corp. v. Biocrest Mfg., L.P., 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps."); < Genentech, Inc. v. Chiron Corp., 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) ("Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.); Moleculon Research

Corp. v. CBS, Inc., 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); In re Baxter, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); Ex parte Davis, 80 USPQ 448, 450 (Bd. App. 1948) ("comprising" leaves "the claim open for the inclusion of unspecified ingredients even in major amounts").

27. In addition, "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir.1998). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 440 F.2d 442, 169 USPQ423 (CCPA 1971).

28. Furthermore, Applicant argued that "in the substrate" means either formed in the original semiconductor body or as an additional epitaxial layer formed over a bulk semiconductor body prior to forming the gate oxide/gate electrode stack thereover. However, during patent examination, the pending claims must be "given *>their< broadest reasonable interpretation consistent with the specification." > In re Hyatt, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). While the claims of issued

patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. > In re American Academy of Science Tech Center, F.3d, 2004 WL 1067528 (Fed. Cir. May 13, 2004)(The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.) < This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) >; Chef America, Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004). Applicant has failed to provide a clear definition in the specification and the claims have been given their plain meaning. The ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application." *Phillips v. AWH Corp.*, __F.3d__, 75 USPQ2d 1321 (Fed. Cir. 2005) (*en banc*).

29. Applicant's arguments with respect to claims 1-5 and 8-11 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lee (US 6,406,973) (of record), Moslehi (US 5,168,072) (of

record), Ozturk et al. (US 5,242,847) (of record) and Murthy et al. (US 6,214,679)(of record) show the use of silicon-germanium during a silicidation process as well known in the art.

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

November 16, 2005

MARIA F. GUERRERO
PRIMARY EXAMINER